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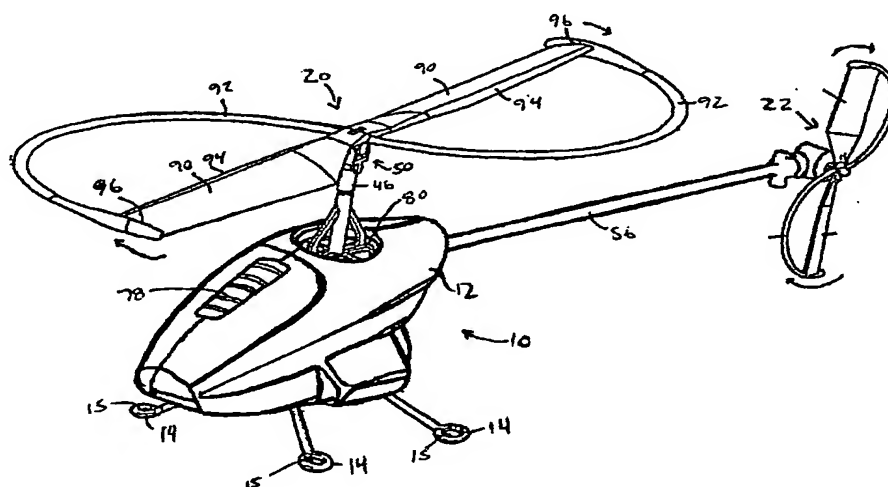
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[Continued on next page]

(54) Title: PROPELLERS, PROPELLER STABILIZERS, AND PROPELLER RELATED VEHICLES



(57) Abstract: Propellers, propeller stabilizers, and propeller related vehicles are provided in accordance with the present invention. In one embodiment of the present invention there is described a helicopter having a motor mechanism for powering a main propeller attached to a drive shaft that extends outwardly from the helicopter. The helicopter further includes a stabilizing mechanism attached between the main propeller and the drive shaft. When the main propeller is rotating and begins to pitch, the centrifugal force created by the rotation thereof will tend to pivot the main propeller about the stabilizing mechanism that offsets the pitch such that the main propeller remains in a substantially horizontal position. In addition various main propeller configurations and stabilizing mechanisms may be employed that provide self-stabilization and different motor mechanisms may be employed to provide alternative ways for powering and rotating the main propeller.

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**PROPELLERS, PROPELLER STABILIZERS, AND  
PROPELLER RELATED VEHICLES**

**Field of the Invention**

[01] This invention relates generally to propellers, propeller stabilizers, and propeller related vehicles and more particular to vehicles, such as air, land and water vehicles, that use or incorporate propellers to create lift or as a means for propulsion, and for most aspects of the present invention relate to air based vehicles designed for the toy or hobby industry.

**Cross-Reference to Related Applications**

[02] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 60/337,670, filed on November 7, 2001, and entitled "Flying Toy" and claims the benefit of U.S. Provisional Patent Application Ser. No. 60/348,891, filed on January 14, 2002, and entitled "Flying Toy", and hereby incorporates both provisional applications by reference.

[03] This application further claims the benefit of U.S. Application Ser. No. 10/189,681, filed July 8, 2002, and entitled "Propellers and Propeller Related Vehicles"; claims the benefit of U.S. Application Ser. No. 10/277,844, filed October 23, 2002, and entitled "Pneumatic Driven Propeller Related Vehicle"; and claims the benefit of U.S. Application Ser. No. 10/277,691, filed October 23, 2002, and entitled "Stabilizer for a Propeller Related Vehicle" and hereby incorporates all three nonprovisional applications by reference.

**Background of the Invention**

[04] While the present invention is related in part to vehicles developed in the toy and hobby industry, there are many types of vehicles that use propellers as a source of lift or as a means for propulsion for which the present invention is applicable. The more common types of these vehicles, which use propellers as a source of propulsion or lift, are air/space based vehicles such as airplanes, helicopters, or unconventional aircraft. However, these vehicles are especially difficult to control and require complex programming and mechanics to operate and control the flight path. In most instances, controlling these vehicles to fly in a stable horizontal position takes countless hours of practice.

[05] Examples of these prior art vehicles are found in the following U.S. Patents; U.S. Patent 5,609,312 is directed to a model helicopter that describes an improved fuselage with a structure that supports radio-control components, and drive train components in an attempt to provide a simple structure; U.S. Patent 5,836,545 is directed to a rotary wing model aircraft that includes a power distribution system that efficiently distributes engine power to the rotary wings and tail rotor system; U.S. Patent 5,879,131 is directed to a main propeller system for model helicopters, which are capable of surviving repeated crashes; and U.S. Patent 4,604,075 is directed to a toy helicopter that includes a removable control unit, which a user may plug into the toy helicopter.

[06] These toys use at least one propeller rotating in a substantially horizontal plane to create and sustain lift. One problem that arises is when the propellers are rotating in the horizontal plane, variations such as wind or power fluctuations may cause the propeller blades to pitch, which further causes the aircraft to tip, turn, oscillate or bank. This effect may be compensated for and corrected with complicated programming and mechanics. However, as mentioned above, these have a tendency to make the aircraft too expensive or

too difficult to control, especially for children. The ability to even maintain horizontal stability in these aircrafts is extremely difficult.

[07] As such a need exists to improve these vehicles that utilize propellers to create and sustain lift to overcome the problems identified above. Such a need should be inexpensive and easy to implement. The outcome should further provide for vehicles that are easy to control or manipulate without the need for complex linkages, servos, gyros or other electromechanical devices.

[08] In addition to the need to improve the stability and control of these vehicles, there is also an increased need to make such vehicles safer. Oftentimes a child or user is injured when the user comes in contact with a rotating propeller. As such there exists a further need to make the propellers safer.

[09] In another object of the present invention, there is a continuing need to create vehicles that use alternate means for powering or driving the propellers. One such alternative means would be a pneumatic engine that runs off of pressurized gas, such as air.

#### **Summary of the Invention**

[10] In a first embodiment of the present invention, a propeller related vehicle is described as a helicopter. The helicopter has an airframe that houses a motor mechanism for powering a main propeller and a tail rotor. The main propeller is attached to a main drive shaft that extends vertically through the airframe. The helicopter further includes a first stabilizing means attached between the main propeller and the main drive shaft. The first stabilizing means permits the main propeller to freely pivot about the main drive shaft independently from the airframe. As such when the main propeller is rotating and the main propeller begins to pitch, a centrifugal force created by the rotation of the main propeller,

tends to pivot the main propeller about the first stabilizing means in a manner that offsets the pitch such that the main propeller remains in a substantially horizontal position.

[11] In another embodiment a propeller related vehicle includes a different stabilizing means attached between a main propeller and a main drive shaft. This second stabilizing means also permits the main propeller to rotate and pivot about the main drive shaft independently from the airframe. However, when the main propeller is rotating and begins to pivot about the main drive shaft, the second stabilizing means tends to resiliently return the main propeller in a substantially horizontal position.

[12] In another embodiment a propeller related vehicle includes a main propeller attached to a third stabilizing means. The third stabilizing means is pivotally attached to the main propeller in a first pivot direction and pivotally attached to the drive shaft in a second pivot direction. The first pivot direction is parallel to a pair of blades defined by the main propeller and the second pivot direction is perpendicular to the first pivot direction

[13] The main propeller of the propeller related aircraft may also include an increased means for self-stabilizing the aircraft. In one embodiment, the main propeller includes a pair of blades extending outwardly from a stabilizing means. (As used throughout the present invention incorporates three different stabilizing means (referred generally to as "stabilizing means"), any one of which could be used with the various propeller configurations described herein.) Each blade includes a leading edge, an end proximal to the stabilizing means, and a distal end. The main propeller also includes a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade. Furthermore, the safety arc has a diameter, which transitions from a relatively flat horizontal surface by the proximal end into a wider vertical surface by the distal end.

[14] In another embodiment, the main propeller includes a pair of blades and a pair of flybars extending outwardly from a center portion of the main propeller that is further attached to a stabilizing means along a horizontal plane. Each blade has a leading edge, an end proximal to the stabilizing means and a distal end. A safety arc is also provided and attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade. When the main propeller is rotating and the main propeller begins to pitch, the flybars, having a centrifugal force created by the rotation thereof, will tend to pivot the blades about the stabilizing means in a manner that offsets the pitch such that the main propeller remains in a substantially horizontal position.

[15] In another embodiment, the main propeller includes a crossbar joint pivotally attached to a stabilizing means. The main propeller includes a pair of blades extending outwardly along a horizontal plane from the crossbar joint, wherein each blade has an end proximal to the crossbar joint and a distal end. A pair of crossbars extends outwardly from the crossbar joint along the horizontal plane. Each crossbar has an end proximally secured to the crossbar joint and an end distal thereto. A circular safety ring is secured to the distal ends of each crossbar and has pivots for receiving the distal ends of each blade. A flybar also extends outwardly along the horizontal plane from both the leading edge and the trailing edge defined in each blade. When the main propeller is rotating and the main propeller begins to pitch, the flybars, having a centrifugal force created by the rotation thereof, will tend to pivot the blades about the stabilizing means in a manner that offsets the pitch such that the main propeller remains in a substantially horizontal position.

[16] In another embodiment, the main propeller includes a blade joint pivotally attached to a stabilizing means. Two pair of blades are extended outwardly along a horizontal plane from the blade joint, such that one pair of blades is perpendicular to the other

pair of blades. Furthermore each pair of blades may pivot independently of the other pair. Each blade has an end proximal to the blade joint and a distal end. A circular safety ring includes pivots for receiving the distal ends of each blade. A flybar also extends outwardly from a leading edge defined in each blade. Wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars, having a centrifugal force created by the rotation thereof, will tend to pivot the blades about the stabilizing means in a manner that offsets the pitch such that the main propeller remains in a substantially horizontal position.

[17] In addition thereto the flybars may include weighted ends to increase the centrifugal force created by the rotation thereof. The main propeller described above may be used in other propeller related vehicles since each exhibits a means for stabilizing the propeller in a single plane, or since the main propellers include safety rings or arcs that decrease the likelihood a user may be injured by a rotating propeller.

[18] In another embodiment of the present invention, a pneumatically driven propelled vehicle is described as a helicopter having an airframe that houses a pneumatic motor mechanism, which is used to power a main propeller. A user can attach an external pump to an intake manifold defined on the pneumatic motor mechanism in order to pump and pressurize air inside of a reservoir. A pneumatic motor utilizes the pressurized air inside the reservoir to rotate a main drive shaft. A stabilizing means is attached between the main propeller and the main drive shaft. The stabilizing means permits the main propeller to rotate and freely pivot about the main drive shaft independently from the airframe. As such when the main propeller is rotating and the main propeller begins to pitch, a centrifugal force created by the rotation of the main propeller, tends to pivot the main propeller about the stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.



[19] Numerous advantages and features of the invention will become readily apparent from the following detailed description of the invention and the embodiments thereof, and from the accompanying drawings.

**Brief Description of the Drawings**

[20] A fuller understanding of the foregoing may be had by reference to the accompanying drawings, wherein:

[21] FIG. 1 is a perspective view of a propeller related vehicle in accordance with the present invention, and more specifically illustrating a helicopter with a first stabilizing means and a first main propeller configured with two blades and half safety arcs in front of the leading edge of each blade;

[22] FIG. 2 is an exploded view of the helicopter from FIG 1;

[23] FIG. 3 is a perspective view of a combo gear that permits the internal cooling of the airframe;

[24] FIG. 4 is a enlarged perspective view of the first stabilizing means in FIG 1;

[25] FIG. 5 is a close-up view of a second stabilizing means, incorporating a resilient means of stabilizing the main propeller;

[26] FIG. 6a is a close-up view of a third stabilizing means that incorporates a dual pivot arrangement;

[27] FIG. 6b is an exploded view of FIG 6a;

[28] FIG. 7 is a perspective view of a second main propeller configured with a pair of blades with half safety arcs and a pair of flybars extending outwardly from the center of the second main propeller;

[29] FIG. 8 is a perspective view of a third main propeller configured with a pair of pivoting blades, two pair of flybars extending outwardly from the proximal ends of the blades, a crossbar, and a full circular safety ring;

[30] FIG. 9 is a perspective view of a fourth main propeller configured with two pairs of pivoting blades (each pair perpendicular to each other and independently and pivotally attached to the helicopter), a full circular safety ring, and a flybar extending perpendicularly from the leading edge of each blade;

[31] FIG. 10 is a perspective view of a fifth main propeller configured with a pair of blades and a pair of flybars both extending outwardly from the center of the fifth main propeller;

[32] FIG. 11 is a perspective view of a sixth main propeller configured with a pair of blades and a crossbar bisecting the blades at the center of the sixth main propeller and further including a circular safety ring attached to the distal ends of the blades and crossbars;

[33] FIG. 12 is a perspective view of another embodiment of the present invention illustrating an airplane utilizing the first main propeller configured in FIG. 1; and

[34] FIG. 13 is a perspective view of a pneumatically driven vehicle in accordance with a second helicopter embodiment illustrating a pneumatic powered helicopter with a main propeller attached to a stabilizing means; and

[35] FIG. 14 is a reverse exploded view of the helicopter from FIG 13.

#### **Detailed Description of the Invention**

[36] While the invention is susceptible to embodiments in many different forms, there are shown in the drawings and will be described herein, in detail, the preferred embodiments of the present invention. It should be understood, however, that the present

disclosure is to be considered an exemplification of the principles of the invention and is not intended to limit the spirit or scope of the invention and/or the embodiments illustrated.

[37] A propeller related vehicle, is illustrated in but one embodiment of the present invention as a helicopter 10, depicted in FIG. 1. Like a typical helicopter the present embodiment includes an airframe 12 that houses any electronics and mechanical components as well as a chassis. Attached to the lower portion of the airframe 12 is landing gear 14 such that the helicopter 10 may rest on a given surface. The helicopter 10 includes a main propeller 20 and a tail rotor 22 for correcting counter-rotation. Both the main propeller 20 and the tail rotor 22 are powered by a motorized means, discussed in greater detail below. The actual design, shape or length of the main propeller 20 may vary with the size and weight of the helicopter 10, such that an appropriate amount of lift is generated for takeoff and sustained flight. The tail rotor 22 rotates at a pre-determined rotation that offsets the torque created by the main propeller 20 when the main propeller 20 is rotating at a maximum revolution per minute (Max RPM). The pre-determined rotation is determined upon a number of factors well known in the art.

[38] Referring now to FIG 2, an exploded view of the helicopter 10 in accordance with the first embodiment is illustrated. The helicopter 10 as mentioned includes an airframe 12 and a main propeller 20 and a tail propeller or rotor 22. The airframe 12 is preferably a two piece housing that secures a two piece chassis defined as an upper chassis 24 and a lower chassis 26. The lower chassis 26 secures the landing gear 14 (FIG 1) or as illustrated in FIG 2, a landing skid 28.

[39] The motorized means 30 includes a power supply 32, such as a battery pack, that powers a motor mechanism 34. The motorized means 30 is controlled through a circuit board 36. A transmitter/receiver 38 may also be employed such that the helicopter 10 may be

remotely operated. The power supply 32 is accessible through a door 40 in the lower chassis 26. As described in greater detail below the vehicle may also use alternate powering means such as but not limited to pneumatic motor mechanisms, which would eliminate the need for a motorized means to provide power to the main propeller.

[40] The motor mechanism 34 drives a motor pinion 42 that is meshed to a combo crown gear 44. The combo crown gear 44 is rotatably mounted in the upper chassis 24. The combo crown gear 44 is also mounted to one end of a main drive shaft 46. The main drive shaft 46 extends upwardly from the combo crown gear 44 through the upper chassis 24. The other end of the main drive shaft 46 is attached to the main propeller 20 via a means for stabilizing the helicopter in a horizontal position (referred to herein as a first stabilizing means 50) discussed in greater detail below.

[41] As mentioned above, the tail rotor 22 is also driven by the motorized means 30. The crown portion of the combo crown gear 44 is meshed to a tail rotor pinion 52, which rotates a tail drive shaft 54 that is mounted thereto. A tail boom 56 is clamped by a boom clamp 58, or otherwise secured, to the upper chassis 24. For stability a tail bushing 60 is positioned within the tail boom 56. The other end of the tail drive shaft 54 is mounted to a tail rotor rear pinion 62. The tail rotor rear pinion 62 is meshed to and drives a tail rotor crown gear 64, which spins a tail rotor axle 66. The tail rotor 22 is secured onto the tail rotor axle 66 such that when the tail drive shaft 54 rotates, the tail rotor 22 rotates. A tail rotor gear housing 68 is positioned to enclose the tail rotor crown gear 64, the tail rotor rear pinion 62 and the tail rotor axle 66.

[42] The helicopter 10 may be turned on/off via a switch 70 mounted through a mounting plate 72 alongside the airframe 12 of the helicopter 10. The on/off switch 70 may also include an access cover 74 such that the switch 70 is not accidentally hit, for instance if

the helicopter 10 crashes. In addition, the power supply 32 may be rechargeable through a charging jack 76. The helicopter 10 may include vents 78 to permit air to cool the motorized means 30 or power supply 32 when running. The ventilation or cooling process is further accomplished by the unique and novel combo gear 44.

[43] As further illustrated in FIG. 3, the combo gear 44 includes a centered bore 44a that permits the combo gear 44 to mount to the upper chassis 24 and the main drive shaft 46. The combo gear 44 also includes outside gearing 44b that meshes to the motor pinion 42 and crown gearing 44c that meshes to the tail rotor pinion 52. The combo gear 44 further includes fan blades 44d that are positioned such that when the combo gear 44 is rotated by the motor pinion 42 the fan blades 44d draw air through the vents 78 into the chassis. Thereby cooling the internal components of the propeller related vehicle.

[44] Continuing to refer to FIG. 2, to further stabilize the upper chassis 24, a grill 80 is positioned over the upper chassis 24 such that the grill 80 may be received by an inside area of the airframe 12, when assembled.

[45] The stabilizing means 50 is defined by mounting the main propeller 20 on a freely pivotal main rotor head 82 (FIG. 4). The main rotor head 82 permits the main propeller 20 to pivot about its center 84. In addition, the rest of the helicopter 10 below the freely pivotal main rotor head 82 can pivot as a pendulum. The main rotor head 82, preferably a U-shaped joint, is secured to a rotor mount 86 that is further secured to the underside of the main propeller 20. The rotor mount 86 is pivotally attached to the main rotor head 82, via a pivot pin 88. The main rotor head 82 is mounted to the main drive shaft 46 such that when the main drive shaft 46 rotates, the main rotor head 82 rotates. This causes the rotor mount 86 to spin, rotating the main propeller 20. It is important to note that the main propeller 20 is preferably mounted such that the main propeller blades 90 are mounted

parallel to the pivot point 88. This allows the main propeller 20 to pivot in the same direction as the blades 90, so the blades 90 can self regulate.

[46] Continuing to refer to FIG. 2, a first main propeller embodiment 20 also depicted in FIG. 1 includes a pair of blades 90 with a pair of safety arcs 92 in front of the leading edges 94 of both blades 90. Each safety arc 92 starts at the center 84 of the main propeller 20 and moves away from the leading edge 94 of the blade in either a circular or elliptical pattern. The safety arcs 92 then join with the outer edge or distal end 96 of the respective blade 90. As the safety arcs 92 move outwardly toward the distal end 96 of the blades 90, it transitions from a relatively flat horizontal surface into a broader, wider vertical surface. The safety arc 92 and the widening of the safety arc 92 increases the surface area, which also serves to distribute a force of any impact over a wider area; thereby protecting the blades 90 upon impact. In addition, when operated by a child the safety arc 92 prevents a child from having a hand or eye scratched by the distal end 96 of a blade 90. In addition the tail rotor 22 may have the same configuration as the main propeller 20.

[47] The safety arcs 92 in conjunction with the fact that the main propeller 20 is freely and pivotally attached to the helicopter 10 provides a helicopter that is self-stabilizing, in other words the main propeller 20 is kept in a substantial horizontal position when the helicopter 10 is operating. It is well known that in true helicopter flight, as the helicopter gains airspeed, the leading edge of the main propeller facing forward and rotating to the back of the helicopter, lifts more than the opposite blade. This causes the helicopter to bank, in the unequal lift. In the present main propeller embodiment 20, the safety arcs 92 create a centrifugal force that tends to offset a pitch force exhibited by the main propeller 20 when rotating, such that the main propeller 20 has a tendency to remain in substantially the same

plane. The weight of the safety arcs 92 also adds weight to the blades 90 to provide a greater gyroscopic effect that stabilizes the main propeller 20.

[48] When the main propeller 20 rotates, if the main propeller 20 begins to pitch, the safety arcs 92 will begin to move off of the horizontal plane. The weight of the safety arcs however, create a gyroscopic effect causing the main propeller 20 to level out by pivoting the blades 90 about the pivot pin 88 in the first stabilizing means 50. The blades 90 pivot along the changing pitch of the main propeller 20 such that the main propeller 20 returns to rotating in a substantially horizontal plane. Thereby stabilizing the helicopter 10 horizontally, keeping it level and in substantially the same position. Similarly, if the body of the helicopter 10 (below the first stabilizing means 50) begins to sway the first stabilizing mean 50 will similarly compensate and return the helicopter to a substantially horizontal position. As such, the present invention provides a novel mechanical means for compensating for any change in the horizontal position of the helicopter without the need for expensive servos and programming.

[49] During operation, the present invention will allow the helicopter 10 to lift straight up and maintain a hover or stationary position. The helicopter 10 may include several forms of control, starting with no control or "free flight," or it may be outfitted with electronics having a microprocessor for "preprogrammed" or "programmable" flight or it may be outfitted with a radio receiver for use with a hand held remote transmitter or it may be any combination of the above.

[50] As mentioned above, the tail rotor 22 rotates at a pre-determined rotation that offsets the torque created by the main propeller 20, when the main propeller 20 is rotating at a Max RPM. With a simple inexpensive remote control unit, a user may be able to adjust the speed of the main propeller 20. If the user decreases the speed of the main propeller 20, the

tail rotor 22 will be rotating at a rate such that its counter rotation force is different during deceleration then what is required to keep the helicopter 10 from rotating at Max RPM or during acceleration. As such the helicopter 10 will begin to rotate about the main drive shaft 46, providing the user with a simple means of rotating or turning the helicopter 10.

[51] Referring now to FIG 5, another or second stabilizing means 100 is illustrated as being attached to a main drive shaft 46. The second stabilizing means 100 includes a shaft joint 102 secured to the end of the main drive shaft 46. The shaft joint 102 includes leg portions 104 that may be rounded about the ends 106. The shaft joint 102 is sized to receive a propeller joint 108, which is attached to the center 84 of the main propeller 20. The two joints 102 and 108 are pivotally attached together about a pivot pin 110. Fitted around the propeller joint 108 and positioned between the ends 106 of the shaft joint 102 and the main propeller 20 is a stabilizer or resilient O-ring 112.

[52] When the main propeller 20 is rotating and the main propeller 20 begins to pivot away from a substantially horizontal plane, the ends 106, of the shaft joint 102, press into a portion of the resilient O-ring 112. As the O-ring 112 tends to maintain its original form, the resiliency of the O-ring 112 exerts a reactionary force on the shaft joint 102. This in turn causes the main propeller 20 to pivot in an opposite direction, which eventually places the main propeller in a substantially horizontal plane or position. The reactionary force may also overcompensate, causing the main propeller 20 to pivot past the horizontal plane, which will cause the ends 106, of the shaft joint 102, to press into another portion of the O-ring 112. However, a new reactionary force would then compensate for this creating a diminishing oscillation or vacillation until the main propeller is in a substantially horizontal plane.

[53] In addition, it is preferable to align the blades 90 of the main propeller 20 along a perpendicular plane to the pivot plane. Thereby, when the main propeller 20 includes flybars



(as described herein below), the flybars will help increase stability maintained by the second stabilizing means 100.

[54] Referring now to FIGS 6a and 6b, another or third stabilizing means 120 is illustrated. The third stabilizing means 120 is connected between a main drive shaft 46 and a main propeller 20 (not shown). The third stabilizing means 120 includes a freely pivotal rotor attachment 122 that permits the main propeller 20 to pivot about its center of rotation. In addition, the rest of the helicopter 10 below the rotor attachment 122 can pivot as a pendulum. The rotor attachment 122 includes clips 124 that frictionally engage a center portion of the main propeller 20. The rotor attachment 122 is pivotally attached to a pivot joint 126 by a first pivot pin 128, which permits the rotor attachment 122 to pivot in a first pivot direction. The pivot joint 126 is also secured to a U-shaped portion 132, defined by a yoke 130, by a pair of pivot pins 134 and in a second pivot direction.

[55] It is important to note that the main propeller 20 is preferably mounted to the rotor attachment 122 such that the main propeller blades 90 are parallel to the first pivot direction about the first pivot pin 128. This allows the main propeller 20 to pivot in the same direction as the blades 90, so the blades 90 when pitching or banking help self-regulate the main propeller 20. Furthermore, the first and second pivot directions are preferably perpendicular to each other to allow the main propeller 20 to pivot perpendicularly from the helicopter 10.

[56] When the main propeller 20 rotates, the rotating main propeller 20 creates a normal centrifugal force. If the main propeller 20 begins to pitch the third stabilizing means 120 along with this normal centrifugal force creates a gyroscopic effect that causes the main propeller 20 to level out. The leveling out effect is achieved when the main propeller 20 begins to pivot about the first pivot direction. The main propeller 20 will pivot along a

changing pitch (created in the gyroscopic effect) such that the main propeller 20 returns to rotating in a substantially horizontal plane; thereby stabilizing the helicopter 10 horizontally, keeping it level. Similarly, if the body of the helicopter 10 (below the stabilizing means) begins to sway, the third stabilizing mean 120 will similarly compensate and return the helicopter 10 to a substantially horizontal position.

[57] In each of the three disclosed stabilizing means, the present invention provides a novel mechanical means for compensating for any change in the horizontal position of the helicopter without the need for expensive servos and programming.

[58] In addition, the stabilizers disclosed herein are applicable to an aircraft having one or more propellers that rotate in a horizontal plane, either powered or freely rotatable. Each propeller is attached to a corresponding shaft that extends vertically through the airframe. The aircraft further includes a stabilizing means (as described herein) that is attached between each propeller and the corresponding shaft. The stabilizing means permits the propeller to pivot in relation to the corresponding shaft. However, when a propeller that is rotating begins to pivot, the stabilizing means offsets the pivot such that the propeller remains in a substantially horizontal plane.

[59] It is also easy to implement and foresee the stabilizing means, of the present invention, being used in a vertically mounted propeller, to create a vertical stabilizing means. This may be used in any vertically mounted propeller, such as in planes, tail rotors in helicopter, air boats, etc. In such circumstances, the propeller would preferably be mounted to a corresponding shaft in a substantially perpendicular plane to the corresponding shaft.

[60] In other embodiments of the present invention, the helicopter may include various main propellers and tail rotors. In addition, each main propeller and/or tail rotor may be attached to one of the disclosed stabilizing means.

[61] Referring now to FIG. 7, a second main propeller embodiment 140 is shown attached to a helicopter 10. The second main propeller 140 includes a pair of opposing positioned blades 90 with safety arcs 92, either elliptical or circular, in front of the leading edges 94 of both blades 92. In addition, extending outwardly from the center 142 of the main propeller 140 is a pair of flybars 144 with weighted ends 146. The flybars 144 add extra stability to the main propeller 140 and also reduce the effect wind may have on the main propeller 140. When the main propeller 140 is rotating, centrifugal force pulls the weighted ends 146 of the flybars 144 straight out, making the main propeller 140 more stable by reducing the ease the main propeller 140 may pivot during operation. The helicopter 10, illustrated in this embodiment may also include a tail rotor 22 configured similarly to previous helicopter 10 depicted in FIG. 1.

[62] Referring now to FIG. 8, in another embodiment of the main propeller or third main propeller embodiment 150, the third main propeller 150 includes two pivoting two blades 90, a full circular safety ring 152 and two pairs of flybars 154. The safety ring 152 is secured to the center 156 of the third main propeller 150 by a pair of crossbars 158. The crossbars 158 attach to a crossbar joint 160 at the center 156 of the third main propeller 150. The safety ring 152 includes pivots 162 that receive the ends 96 of the blades 90 that are distal to the center 156 of the third main propeller 150. The pivots 162 and the crossbar joint 160 permit the blades 90 to pivot independently from the safety ring 152. The two pair of flybars 154 are attached to the ends of the blades 90, which are proximal to the center 156 of the third main propeller 150. In addition, the flybars 154 may also include weighted ends 164. Since the flybars 154 are secured to the blades 90, the flybars 154 will pivot with the blades 90.

[63] The flybars 154, in conjunction with the single axis pivot of the blades 90 will help keep the third main propeller 150 in equilibrium when the third main propeller is spinning. As mentioned above in previous propeller embodiments, when the propeller is rotating, the blades 90 will pivot to compensate for any banking or unequal lift forces. In addition, when rotating, the centrifugal force will pull the weighted ends 164 on the flybars 154 outwardly making the blades 90 more stable by reducing the ease the blades 90 may pivot. Additionally, even if the flybars 154 did not include weighted ends the centrifugal force would still pull on the flybars 154 themselves, increasing the stability of the third main propeller 150.

[64] In another embodiment, FIG. 9, the helicopter 10 utilizes a fourth main propeller embodiment 170 that has four pivoting blades 172 with a full circular safety ring 174 and flybars 176 attached separately to each blade 172. The blades 172 are arranged in two pairs (172a and 172b); each pair (172a and 172b) is set perpendicular to each other. The safety ring 174 includes four pivots 178, each positioned to receive an end of a blade 172 that is distal from the center 180 of the fourth main propeller 170. The center 180 includes a double joint 182 that acts in concert with the pivots 178 such that the two pairs (172a and 172b) of blades 172 may pivot independently of each other. Extending outwardly from the leading edge 184 of each blade 172 is a flybar 176, which may include a weighted end 186.

[65] The dual-axis pivot created by the two pairs (172a and 172b) of independently pivoting blades 172 helps keep the fourth main propeller 170 in equilibrium when rotating. In addition, when the fourth main propeller is rotating, a centrifugal force pulls the flybars 176, and especially the weighted ends 186, outwardly increasing stability by reducing the amount of pivot the blades 172 may exhibit.

[66] In yet another embodiment of the present invention, as depicted in FIG. 10, a helicopter 188 includes a fifth main propeller embodiment 190. The helicopter 188 may also be similar to any one of the helicopter embodiments mentioned above or herein below. The fifth main propeller 190 includes a pair of blades 192 connected at the center 194, of the fifth main propeller 190, to a stabilizing means 200. A pair of perpendicular flybars 196 bisects the main propeller 190 also at the center 194. Each flybar 196 may also include weighted ends 198. When the main propeller 190 and flybars 196 rotate, the main propeller 190 may begin to pitch causing the flybars 196 to move off of the horizontal plane. The weighted ends 198 create a gyroscopic effect causing the flybars 196 to level out by pivoting about the stabilizing means 200. This causes the main propeller 190 to pivot along the flybars' 196 axis, which changes the pitch of the main propeller 190 such that the blades 192 and the flybars 196 return to rotating in the same horizontal plane. Thereby stabilizing the helicopter 188 horizontally, keeping it level and in the same position.

[67] Referring now to FIG 11, a sixth main propeller embodiment 210 includes a pair of blades 212 that extend outwardly from a center support 214. A pair of crossbars 216 also extends outwardly from the center support 214 and are perpendicular to the blades 212. To protect a user from and to protect the blades and crossbars when they are rotating, a circular safety ring 218 is secured to the ends 213 of the blades 212 and the ends 217 of the crossbars 216.

[68] As should be readily apparent from the above description each of the main propellers described above may be and preferably is mounted to a stabilizing means, increasing the ability to keep the helicopter in a level horizontal plane during operation. However, the propellers may also be incorporated onto a helicopter that does not include a

stabilizing means, as each of the main propellers described above, by themselves, assist in keeping a helicopter in a substantially horizontal plane.

[69] As illustrated in FIGS 1 and 7-9, the landing gear 14 may include apertures 15 such that the helicopter 10 may be properly positioned on a launching/landing pad or base (not shown). The base may function both to charge the power supply in the helicopter and to energize the main propeller of the helicopter to a sufficient RPM required for launching the helicopter from the launching base. The launching base may also include batteries and a timer circuit for charging the helicopter and may have a separate motor for energizing the main propeller. The charger may either be equipped to turn off after a certain amount of time or until the battery reaches a certain voltage.

[70] In addition, the helicopter may or may not take the form of "traditional" styling and the embodiments disclosed herein used to make the propellers stable and safe could be used in other flying toys, such as airplanes and other unconventional aircraft, such as but not limited to a vehicle using two or more horizontal propellers. In but one example, illustrated in FIG 12, an airplane 220 includes a pair of propellers 222 configured similarly to the first main propeller embodiment 20, and more particularly to a propeller 222 that includes a pair of blades 224, each blade includes a half safety arc 226 covering the leading edge 228 of each blade 224.

[71] In addition, the present invention is applicable to an aircraft having one or more propellers that rotate in a horizontal plane. The aircraft would typically have an airframe for housing a motor mechanism, which is used to power each propeller. Each propeller is attached to a corresponding drive shaft that extends vertically through the airframe. The aircraft further includes a horizontal stabilizing means attached between each propeller and the corresponding drive shaft, which permits the propeller to freely pivot about

the corresponding drive shaft independently from the airframe. As such when a propeller that is rotating begins to pitch, the rotating propeller has a centrifugal force created by the rotation thereof that tends to pivot the propeller about the horizontal stabilizing means in a manner that offsets the pitch such that the aircraft remains in a substantially horizontal position.

[72] As mentioned above, there is also a continuing need to provide alternate means of powering the propeller related vehicles, and one additional or alternate means includes a pneumatic operated propeller related vehicle, such as illustrated in FIGS. 13-14. Referring now to FIGS 13 and 14, a second helicopter embodiment 250 is illustrated. The second helicopter embodiment 250 includes an outer housing 252 that houses a reservoir 254 to hold a pressurized fluid. The reservoir 254 is secured to or rests upon a chassis 256, which has an upper portion 258 that is secured within the housing 252. Also attached to the chassis 256 are landing skids 260 such that the helicopter 250 may rest on a given surface.

[73] The reservoir 254 includes an open end 262 that receives one end 264 of an inlet assembly 266. The inlet assembly 266 is secured to the open end 262 by a cap 268. A pneumatic motor mechanism 270 includes an intake manifold 272 that may be attached to an outside pump (shown in FIG. 13). The air entering the intake manifold 272 will, first, pass through a tube 274 that is attached to a first opening 276 defined in the inlet assembly 266 and then passes into the reservoir 254 via its open end 262. As the user continues to force or pump air into the reservoir 254 the air inside the reservoir 254 will then pressurize. A pneumatic motor 278 secured to the intake manifold 272 is also in fluid communication with the reservoir 254 via a second opening 280 defined in the inlet assembly 266. The air flow entering and exiting the reservoir 254 is controlled through various well known valves (not shown) contained within the intake manifold 272, the pneumatic motor 278 and/or the inlet

assembly 266. The pneumatic motor 278 uses the pressurized fluid contained in the reservoir 254 to rotate a main drive shaft 282.

[74] The main drive shaft 282 is connected to a stabilizing means 284, which is further connected or secured to a main propeller 286. The stabilizing means 284 and the main propeller 286 may be any of the stabilizing means or main propeller embodiments previously mentioned. As illustrated in FIGS. 13 and 14 the stabilizing means 284 is preferably the third stabilizing means illustrated in FIGS. 6a and 6b and the main propeller 286 is preferably the sixth main propeller embodiment illustrated in FIG. 11.

[75] Continuing to refer to FIGS. 13 and 14, the stabilizing means 284 (similar to the third stabilizing means from FIGS. 6a and 6b) includes a freely pivotal rotor attachment 122 that permits the main propeller 286 to pivot about its center of rotation. In addition, the rest of the helicopter 250, below the rotor attachment 122, can pivot as a pendulum. The rotor attachment 288 includes clips 124 to frictionally engage a center portion of the propeller 286. The rotor attachment 122 is pivotally attached to a pivot joint 126 by a first pivot pin 128, which permits the rotor attachment 122 to pivot in a first pivot direction. The pivot joint 126 is also secured to a U-shaped portion 132, defined by a yoke 130, by a pair of pivot pins 134 and in a second pivot direction.

[76] It is important to note that the main propeller 286 is preferably mounted to the rotor attachment 122 such that the main propeller blades 212 are parallel to the first pivot direction about the first pivot pin 128. This allows the main propeller 286 to pivot in the same direction as the blades 212, so the blades 212 when pitching or banking help self-regulate the main propeller 286. Furthermore, the first and second pivot directions are preferably perpendicular to each other to allow the main propeller 286 to pivot perpendicularly from the helicopter 250.



[77] Also attached to the helicopter 250 is a vertical rudder 288, which is clipped by a reservoir clip 292 onto a neck 290, defined on the reservoir 254. The reservoir clip 292 is attached to a horizontal beam 294 that extends outwardly. The beam 294 is secured to a rudder clip 296 that attaches to the vertical rudder 288.

[78] When the main propeller 286 rotates, the rotating main propeller 286 with the weight of the safety ring 218 and crossbars 212 creates a normal centrifugal force. If the main propeller 286 begins to pitch, the stabilizing means 284 along with this normal centrifugal force creates a gyroscopic effect that causes the main propeller 286 to level out. The leveling out effect is achieved when the main propeller 286 begins to pivot about the first pivot direction. The main propeller 286 will pivot along a changing pitch (created in the gyroscopic effect) such that the main propeller 286 returns to rotating in a substantially horizontal plane; thereby stabilizing the helicopter 250 horizontally, keeping it level. Similarly, if the body of the helicopter 250 (below the stabilizing means 284) begins to sway, the stabilizing mean 284 will similarly compensate and return the helicopter 250 to a substantially horizontal position. As such, the present invention provides a novel mechanical means for compensating for any change in the horizontal position of the helicopter without the need for expensive servos and programming.

[79] During operation, the second helicopter embodiment 250 will lift straight up and maintain a hover or stationary position. The helicopter 250 may include several forms of control, starting with no control or "free flight," or it may be outfitted with electronics having a microprocessor for "preprogrammed" or "programmable" flight or it may be outfitted with a radio receiver for use with a hand held remote transmitter or it may be any combination of the above.

[80] To operate the helicopter 250, a user must first fill the reservoir 254 with pressurized air. The user may use an external pump 300, such as illustrated in FIG. 13, by securing an outlet 302 defined by the pump 300 to an inlet 304 on the intake manifold 272. The user may then begin to pump air into and pressurize air contained in the reservoir 254. Once the reservoir 254 contains a sufficient amount of pressurized air, the user detaches the helicopter 250 from the pump 300 and initiates the pneumatic motor 278 by initially rotating the main propeller 286. However, it could be contemplated that the main propeller 286 will start automatically once the reservoir 254 contains pressurized fluid. The helicopter 250 will use the pressurize fluid to rotate the main propeller 286 and lift off of the ground or away from the user. In free flight, the helicopter 286 will continue to rise and maintain a substantially horizontal orientation without banking or pitching too much because of the stabilizing means. Once the fluid inside the reservoir 254 is depleted, the propeller 286 will continue to rotate slower and slower as the momentum decreases. This permits the helicopter 250 to glide back down to the ground.

[81] The embodiments disclosed herein, as previously mentioned, are also applicable for an aircraft having one or more propellers that rotate in a horizontal plane. The aircraft would typically have an airframe for housing a reservoir that is used by a single pneumatic motor to rotate a plurality of drive shafts, each corresponding to a propeller. Alternatively, the reservoir could be used by a plurality of pneumatic motors or it is even contemplated that the airframe of the aircraft would house multiple reservoirs, each used by a corresponding pneumatic motor. The aircraft also includes a horizontal stabilizing means attached between each propeller and the corresponding drive shaft, which permits the propeller to freely pivot about the corresponding drive shaft independently from the airframe. As such when a propeller that is rotating begins to pitch, the rotating propeller has a

centrifugal force created by the rotation thereof that tends to pivot the propeller about the horizontal stabilizing means in a manner that offsets the pitch such that the aircraft remains in a substantially horizontal position.

[82] From the foregoing and as mentioned above, it will be observed that numerous variations and modifications may be effected without departing from the spirit and scope of the novel concept of the invention. For example, the propeller, while shown may be used in airplanes, may find further applications in other propeller driven vehicles, either miniature or life-size, such as but not limited to water driven vehicles (such as boats and submarines), land driven vehicles (such as propeller operated cars) and other air driven vehicles (such as rockets) as well as other products that use propellers. It is to be understood that no limitation with respect to the specific methods and apparatus illustrated herein is intended or should be inferred.

We claim:

Claim 1. A helicopter having an airframe housing, a motor mechanism for powering a main propeller attached to a main drive shaft that extends vertically through the airframe and for powering a tail rotor, the helicopter further comprising a horizontal stabilizing means attached between the main propeller and the main drive shaft, which permits the main propeller to freely pivot about the main drive shaft independently from the airframe, wherein when the main propeller is rotating and the main propeller begins to pitch, the rotating main propeller having a centrifugal force created by the rotation thereof will tend to pivot about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 2. The helicopter of claim 1, wherein the main propeller includes:

a pair of blades extending outwardly from the horizontal stabilizing means, each blade having a leading edge, a proximal end defined as an end proximal to the horizontal stabilizing means, and a distal end; and

a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade.

Claim 3. The helicopter of claim 2, wherein the safety arc has a diameter that transitions from a relatively flat horizontal surface by the proximal end into a wider vertical surface by the distal end.

Claim 4. The helicopter of claim 1, wherein the main propeller includes:

a pair of blades extending outwardly from the horizontal stabilizing means along a horizontal plane, each blade having a leading edge, a proximal end defined as an end proximal to the horizontal stabilizing means and a distal end;

a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade; and

a pair of flybars extending outwardly from the horizontal stabilizing means along said horizontal plane, wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 5. The helicopter of claim 1, wherein the main propeller includes:

a crossbar joint that is secured to the horizontal stabilizing means;

a pair of blades pivotally extending outwardly along a horizontal plane from the crossbar joint, each blade having an end proximal to the crossbar joint and a distal end;

a pair of crossbars extending outwardly from the crossbar joint along the horizontal plane, each crossbar having an end proximal secured to the crossbar joint and a distal end;

a circular safety ring secured to the distal ends of each crossbar and having pivots for receiving the distal ends of each blade; and

a flybar extending outwardly both from a leading edge and a trailing edge defined in each blade, each flybar extending along said horizontal plane, wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the

horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 6. The helicopter of claim 1, wherein the main propeller includes:

two pair of blades pivotally extending outwardly along a horizontal plane from the horizontal stabilizing means, such that one pair of blades is perpendicular to the other pair of blades, each blade having an end proximal to the horizontal stabilizing means and a distal end;

a circular safety ring having pivots for receiving the distal ends of each blade; and

a flybar extending outwardly from a leading edge defined in each blade, wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 7. The helicopter of claims 4, 5, or 6, wherein the flybars include weighted ends to increase the centrifugal force created by the rotation thereof.

Claim 8. The helicopter of claims 4, 5, or 6, wherein the horizontal stabilizing means is defined as a pivotal main rotor head mounted to the main drive shaft, and a main propeller mount extending downwardly from the main propeller; the main propeller mount pivotally mounted to the pivotal main rotor head such that the main propeller may pivot about the main drive shaft.

Claim 9. An aircraft having an airframe housing a motor mechanism for powering at least one substantially horizontal orientated propeller, each propeller is attached to a corresponding drive shaft that extends vertically through the airframe, the aircraft further comprising at least one horizontal stabilizing means attached between one of the propellers, of the at least one propeller, and the corresponding drive shaft, which permits the propeller to freely pivot about the corresponding drive shaft independently from the airframe, wherein when said propeller is rotating and said rotating propeller begins to pitch, the rotating propeller having a centrifugal force created by the rotation thereof will tend to pivot about the horizontal stabilizing means in a manner that offsets the pitch such that the aircraft remains in a substantially horizontal position.

Claim 10. The helicopter of claim 9, wherein at least one of the at least one propeller includes:

- a pair of blades extending outwardly from the horizontal stabilizing means, each blade having a leading edge, a proximal end defined as an end proximal to the horizontal stabilizing means, and a distal end; and

- a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade.

Claim 11. The helicopter of claim 10, wherein the safety arc has a diameter that transitions from a relatively flat horizontal surface by the proximal end into a wider vertical surface by the distal end.

Claim 12. The helicopter of claim 9, wherein at least one of the at least one propeller includes:

a pair of blades extending outwardly from the horizontal stabilizing means along a horizontal plane, each blade having a leading edge, a proximal end defined as an end proximal to the horizontal stabilizing means and a distal end;

a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade; and

a pair of flybars extending outwardly from the horizontal stabilizing means along said horizontal plane, wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 13. The helicopter of claim 9, wherein the main propeller includes:

a pair of blades pivotally extending outwardly along a horizontal plane from the horizontal stabilizing means, each blade having an end proximal to the horizontal stabilizing means and a distal end;

a crossbar joint that is secured to the proximal ends of the blades;

a pair of crossbars extending outwardly from the crossbar joint along the horizontal plane, each crossbar having an end proximal secured to the crossbar joint and a distal end;

a circular safety ring secured to the distal ends of each crossbar and having pivots for receiving the distal ends of each blade; and

a flybar extending outwardly both from a leading edge and a trailing edge defined in each blade, each flybar extending along said horizontal plane, wherein when the main



propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 14. The helicopter of claim 9, wherein the main propeller includes:

two pair of blades pivotally extending outwardly along a horizontal plane from the horizontal stabilizing means, such that one pair of blades is perpendicular to the other pair of blades, each blade having an end proximal to the horizontal stabilizing means and a distal end;

a circular safety ring having pivots for receiving the distal ends of each blade; and

a flybar extending outwardly from a leading edge defined in each blade, wherein when the main propeller is rotating and the main propeller begins to pitch, the flybars having an increased centrifugal force created by the rotation thereof will tend to pivot the blades about the horizontal stabilizing means in a manner that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 15. The helicopter of claims 12, 13, or 14, wherein the flybars include weighted ends to increase the centrifugal force created by the rotation thereof.

Claim 16. The helicopter of claims 12, 13, or 14, wherein the horizontal stabilizing means is defined as a pivotal main rotor head mounted to the main drive shaft, and a main propeller mount extending downwardly from the main propeller; the main propeller mount

pivotaly mounted to the pivotal main rotor head such that the main propeller may pivot about the main drive shaft.

Claim 17. A self-stabilizing aircraft having at least one propeller comprising:

a motor mechanism in communication with at least one drive shaft, each drive shaft corresponding to one of the propellers, of the at least one propeller,

a rotor head mounted to each drive shaft; and

each propeller having a propeller mount that is pivotaly attached to the rotor head of the corresponding drive shaft, such that each propeller may pivot about the corresponding drive shaft independently from the aircraft, wherein when the propeller is rotating and the propeller begins to pitch, the rotating propeller having a centrifugal force created by the rotation thereof will tend to pivot about the corresponding drive shaft in a manner that offsets the pitch such that the aircraft remains in a substantially horizontal position.

Claim 18. The self-stabilizing aircraft of Claim 17, wherein at least one of the propellers, includes: a pair of blades extending outwardly from each other, each blade having a leading edge, a proximal end defined as an end proximal to the other blade, and a distal end; and a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade.

Claim 19. The self-stabilizing aircraft of Claim 17, wherein at least one of the propellers, includes: a pair of blades extending outwardly from the propeller mount of said propeller; and a pair of flybars extending outwardly from said propeller mount.

Claim 20. The self-stabilizing aircraft of Claim 17, wherein at least one of the propellers, includes: a pair of blades extending outwardly from the propeller mount of said propeller, each blade having a leading edge, a proximal end defined as an end proximal to said propeller mount and a distal end; a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade; and a pair of flybars extending outwardly from said propeller mount.

Claim 21. The self-stabilizing aircraft of Claim 17, wherein at least one of the propellers, includes: a pair of blades extending outwardly from the propeller mount of said propeller, each blade having an end proximal to said propeller mount and a distal end; a crossbar joint that is secured to the proximal ends of the blades; a pair of crossbars extending outwardly from the crossbar joint, each crossbar having an end proximal secured to the crossbar joint and a distal end; a circular safety ring secured to the distal ends of each crossbar and having pivots for receiving the distal ends of each blade; and a flybar extending outwardly both from a leading edge and a trailing edge defined in each blade.

Claim 22. The self-stabilizing aircraft of Claim 17, wherein at least one of the propellers, includes: two pair of blades extending outwardly from the propeller mount of said propeller, such that one pair of blades is perpendicular to the other pair of blades, each blade having an end proximal to said propeller mount and a distal end; a circular safety ring having pivots for receiving the distal ends of each blade; and a flybar extending outwardly from each leading edge defined in each blades.

Claim 23. A self-stabilizing propeller for use in a rotary-type aircraft wherein the propeller is rotatably attached to a drive shaft and rotates in a plane, the propeller comprising:

a pair of blades extending outwardly from each other, each blade having a leading edge, a proximal end defined as an end proximal to the other blade, and a distal end; and

a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade, each safety arc having a predetermined weight, wherein when the propeller is rotating the weight of the safety arcs creates a centrifugal force that tends to offset a pitch force exhibited by the propeller when rotating such that the propeller has a tendency to remain in substantially the same plane.

Claim 24. The helicopter of claim 23, wherein the safety arc has a diameter that transitions from a relatively flat horizontal surface by the proximal end into a wider vertical surface by the distal end.

Claim 25. A self-stabilizing propeller for use in a rotary-type aircraft wherein the propeller is rotatably attached to a drive shaft and rotates in a plane, the propeller comprising:

a pair of blades pivotally and rotatably attached to the drive shaft along the plane, each blade having a leading edge, a proximal end defined as an end proximal to the drive shaft and a distal end;

a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade; and

a pair of flybars extending outwardly from the drive shaft along the plane, wherein when the propeller is rotating and the propeller begins to pitch, the flybars having a centrifugal force created by the rotation thereof will tend to pivot the blades about the drive

shaft in a manner that offsets the pitch such that the propeller has a tendency to remain in the plane.

Claim 26. A self-stabilizing propeller for use in a rotary-type aircraft wherein the propeller is rotatably attached to a drive shaft and rotates in a plane, the propeller comprising:

- a pair of blades pivotally and rotatably in communication with the drive shaft and extending outwardly from said drive shaft along the plane, such that when the drive shaft rotates the blades rotate, each blade having an end proximal to the drive shaft and a distal end;

- a crossbar joint that is secured to the proximal ends of the blades;

- a pair of crossbars extending outwardly from the crossbar joint, along the plane, each crossbar having an end proximal secured to the crossbar joint and a distal end;

- a circular safety ring secured to the distal ends of each crossbar and having pivots for receiving the distal ends of each blade; and

- a flybar extending outwardly both from a leading edge and a trailing edge defined in each blade, each flybar extending along said plane, wherein when the propeller is rotating and the propeller begins to pitch, the flybars having a centrifugal force created by the rotation thereof have a tendency to pivot the blades about the drive shaft in a manner that offsets the pitch such that the propeller has a tendency to remain in the plane.

Claim 27. A self-stabilizing propeller for use in a rotary-type aircraft wherein the propeller is rotatably attached to a drive shaft and rotates in a plane, the propeller comprising:

- two pair of blades pivotally and rotatably in communication with the drive shaft, each blade extending outwardly along the plane from the drive shaft, such that one pair of blades is

perpendicular to the other pair of blades, each blade having an end proximal to the drive shaft and a distal end;

a circular safety ring having pivots for receiving the distal ends of each blade; and

a flybar extending outwardly from each leading edge defined in the blades, wherein when the propeller is rotating and the propeller begins to pitch, the flybars having a centrifugal force created by the rotation thereof have a tendency to pivot the blades about the drive shaft in a manner that offsets the pitch such that the propeller has a tendency to remain in the plane.

Claim 28. The helicopter of claims 25, 26, or 27, wherein the flybars include weighted ends to increase the centrifugal force created by the rotation thereof.

Claim 29. A propeller comprising: a pair of blades extending outwardly from each other, each blade having a leading edge, a proximal end defined as an end proximal to the other blade, and a distal end; and a safety arc attached to the proximal and distal ends of each blade and positioned in front of the leading edge of each blade.

Claim 30. The propeller of Claim 29, wherein the safety arc has a diameter that transitions from a relatively flat horizontal surface by the proximal end into a wider vertical surface by the distal end.

Claim 31. The propeller of Claim 29 further comprising a pair of flybars extending outwardly from the proximal ends of the blades.

Claim 32. A propeller comprising: a pair of blades extending outwardly from each other, each blade having an end proximal to said propeller mount and a distal end; a crossbar joint that is secured to the proximal ends of the blades; a pair of crossbars extending outwardly from the crossbar joint, each crossbar having an end proximal secured to the crossbar joint and a distal end; and a circular safety ring secured to the distal ends of each crossbar and having pivots for receiving the distal ends of each blade.

Claim 33. The propeller of Claim 32 further comprising: a flybar extending outwardly both from a leading edge and a trailing edge defined in each blade.

Claim 34. A propeller comprising: two pair of blades extending outwardly from the propeller mount of said propeller, such that one pair of blades is perpendicular to the other pair of blades, each blade having an end proximal to said propeller mount and a distal end; and a circular safety ring having pivots for receiving the distal ends of each blade.

Claim 35. The propeller of Claim 34 further comprising a flybar extending outwardly from each leading edge defined in each blade.

Claim 36. The propeller of Claims 31, 33 or 35, wherein each flybar includes a weighted end.

Claim 37. As is claimed in claim 1 or claim 9 further comprising a means for internally cooling the airframe defined by having a plurality of vents positioned in the airframe and a combo gear in communication with the motor mechanism, the combo gear having a plurality

of cooling blades positioned such that when the combo gear rotates the cooling blades draw air through the plurality of vents into the airframe.

Claim 38. The aircraft of claim 17 wherein the aircraft further includes an airframe housing the motor mechanism, and a means for internally cooling the aircraft defined by having a plurality of vents positioned in the airframe and a combo gear in communication with the motor mechanism, the combo gear having a plurality of cooling blades positioned such that when the combo gear rotates the cooling blades draw air through the plurality of vents into the airframe.

Claim 39. A helicopter including a motor mechanism to rotate a drive shaft that pivotally attaches to and rotates a main propeller, the helicopter further comprising:

- a horizontal stabilizer attached between the drive shaft and the main propeller, the horizontal stabilizer including a means to exert a reactionary force on the main propeller, when the main propeller pivots in relation to the drive shaft, wherein the reactionary force tends to place the main propeller in a substantially horizontal position.

Claim 40. The helicopter of Claim 39, wherein the horizontal stabilizer includes:

- a first U-shaped joint secured to the drive shaft, the first U-shaped joint having a pair of legs, each leg includes an end that is substantially rounded;

- a second U-shaped joint secured to the main propeller;

- a pivot pin pivotally attaching the second U-shaped joint to the first U-shaped joint such that the ends of each leg of the first U-shaped joint is positioned substantially toward the main propeller; and



a resilient O-ring positioned between the ends of the first U-shaped joint and the main propeller, whereby the resilient O-ring will exert a reactionary force on the main propeller, when the main propeller pivots in relation to the drive shaft such that the reactionary force tends to return the main propeller to the substantially horizontal position.

Claim 41. A vehicle comprising:

a propeller pivotally mounted to a shaft and in a substantially perpendicular plane to the shaft; and

a stabilizing means attached between the propeller and the shaft, when the propeller pivots in relation to the shaft, the stabilizing means includes a means to exert a reactionary force on the propeller, such that the reactionary force tends to place the propeller in said substantially perpendicular plane to the shaft.

Claim 42. The vehicle of Claim 41, wherein the stabilizing means comprises:

a propeller joint secured to the propeller;

a shaft joint secured to the shaft, and the propeller joint is pivotally attached to the shaft joint; and

a resilient O-ring positioned between the propeller joint and the shaft joint such that the shaft joint presses into the O-ring, when the propeller pivots in relation to the shaft.

Claim 43. The vehicle of claim 42, wherein the propeller is mounted in a substantially horizontal plane.

Claim 44. The vehicle of claim 42, wherein the propeller is mounted in a substantially vertical plane.

Claim 45. A stabilizing means attached between a propeller and a shaft, wherein the propeller is pivotally mounted to the shaft and in a substantially perpendicular plane to the shaft, the stabilizing means including a resilient member that exerts a reactionary force on the propeller when the propeller pivots in relation to the shaft, and which reactionary force tends to return the propeller to said substantially perpendicular plane.

Claim 46. The stabilizing means of Claim 45, further including:

- a propeller joint secured to the propeller;

- a shaft joint secured to the corresponding shaft, and the propeller joint is pivotally attached to the shaft joint; and

- a resilient O-ring positioned between the propeller joint and the shaft joint, whereby when the propeller pivots out of the substantially perpendicular plane to the shaft, resiliency of the O-ring exerts a reactionary force on the propeller, such that the propeller substantially returns to the substantially perpendicular plane.

Claim 47. A vehicle including a motor mechanism to rotate a drive shaft that pivotally attaches to and rotates a main propeller, the vehicle comprising:

- a horizontal stabilizing means attached between the main propeller and the main drive shaft, which permits the main propeller to freely pivot about the main drive shaft independently from the airframe, wherein when the main propeller is rotating and the main propeller begins to pitch, the rotating main propeller having a centrifugal force created by the

rotation thereof will tend to pivot about the horizontal stabilizing means in a gyroscopic effect that offsets the pitch such that the helicopter remains in a substantially horizontal position, the horizontal stabilizing means includes:

- a rotor attachment that attaches to the main propeller,
- a joint that pivotally connects in a first pivot direction to a lower end defined in the rotor attachment, and
- a yoke pivotally attached to the joint in a second pivot direction.

Claim 48. A vehicle including a motor mechanism to rotate a drive shaft that pivotally attaches to and rotates a main propeller, the vehicle comprising a horizontal stabilizing means attached between the main propeller and the drive shaft, the horizontal stabilizing means pivotally attached to the main propeller in a first pivot direction and pivotally attached to the drive shaft in a second pivot direction, the first pivot direction being parallel to a pair of blades defined by the propeller and the second pivot direction is perpendicular to the first pivot direction.

Claim 49. The aircraft of Claim 48, wherein the main propeller further includes a pair of crossbars perpendicular to the blades and includes a safety ring attached to ends defined by the blades and crossbars, the ends of the blades and crossbars are distal to a center support area that attaches to the horizontal stabilizing means.

Claim 50. The aircraft of Claim 49, wherein the horizontal stabilizing means further includes:

- a rotor attachment that attaches to the center support area of the propeller,

a joint that pivotally connects in the first pivot direction to a lower end defined in the rotor attachment, and

a yoke pivotally attached to the joint in the second pivot direction.

Claim 51. A helicopter comprising:

an airframe housing at least a reservoir;

a means to refill and pressurize air inside the reservoir;

a pneumatic motor mechanism that utilizes pressurized air inside the reservoir to rotate a main drive shaft;

a main propeller that is rotated by the main drive shaft; and

a horizontal stabilizing means attached between the main propeller and the main drive shaft, which permits the main propeller to freely pivot about the main drive shaft independently from the airframe, wherein when the main propeller is rotating and the main propeller begins to pitch, the rotating main propeller having a centrifugal force created by the rotation thereof will tend to pivot about the horizontal stabilizing means in a gyroscopic effect that offsets the pitch such that the helicopter remains in a substantially horizontal position.

Claim 52. The helicopter of Claim 51, wherein the pneumatic motor mechanism includes:

an intake manifold in communication with the reservoir, the intake manifold permits air to enter into the reservoir from an outside source, and

a pneumatic motor in communication with the reservoir and the main drive shaft, the pneumatic motor utilizes pressurized air from the reservoir to rotate the main drive shaft.

Claim 53. The helicopter of Claim 52 further comprising an external pumping means that is attachable to the intake manifold for pumping air into and pressurizing air inside the reservoir.

Claim 54. The helicopter of Claim 51, wherein the horizontal stabilizing means includes:  
a rotor attachment that attaches to the main propeller,  
a joint that pivotally connects in a first pivot direction to a lower end defined in the rotor attachment, and  
a yoke pivotally attached to the joint in a second pivot direction.

Claim 55. The helicopter of Claim 54, wherein the first pivot direction is perpendicular to the second pivot direction.

Claim 56. The helicopter of Claim 51, wherein the main propeller includes:  
a center support defined about the horizontal stabilizing means;  
a pair of blades extending outwardly from the center support, each blade having an end distal to the horizontal stabilizing means;  
a pair of crossbars extending outwardly from the center support and perpendicularly from the blades, each crossbar have an end distal from the center support; and  
a safety ring attached to the distal ends of each blade and crossbar.

Claim 58. The helicopter of Claim 51, wherein the horizontal stabilizing means is defined as being pivotally attached to the main propeller in a first pivotal direction and

pivotaly attached to the main drive shaft in a second pivotal direction that is perpendicular to the first pivotal direction.

Claim 59. The helicopter of Claim 58, wherein the main propeller includes at least a pair of blades that extend outwardly from the horizontal stabilizing means in a direction that is parallel to the first pivotal direction.

Claim 60. An aircraft having a pneumatic motor mechanism for powering a horizontal orientated propeller, the propeller is attached to a drive shaft that is rotated by said pneumatic motor mechanism, the aircraft further comprising a horizontal stabilizing means attached between the propeller and the drive shaft, which permits the propeller to freely pivot about the drive shaft independently from the airframe, and wherein when said propeller is rotating and said rotating propeller begins to pitch, the rotating propeller having a centrifugal force created by the rotation thereof will tend to pivot about the horizontal stabilizing means in a manner that offsets the pitch such that the aircraft remains in a substantially horizontal position.

Claim 61. The aircraft of Claim 60 further comprising:

a reservoir housed within the airframe to store a pressurized fluid that is used by the pneumatic motor mechanism to rotate the propeller.

Claim 62. The aircraft of Claim 61, wherein the pneumatic motor mechanism includes:

an intake manifold in communication with the reservoir and having a means to attach to an external pump, which is used to pump air into and pressurize air inside the reservoir; and

a pneumatic motor in communication with the reservoir and the drive shaft, the pneumatic motor uses pressurized air from the reservoir to rotate the drive shaft.

Claim 63. The aircraft of Claim 62, wherein the horizontal stabilizing means includes  
a rotor attachment that attaches to the propeller,  
a joint that pivotally connects in a first pivot direction to a lower end defined in the rotor attachment, and  
a yoke pivotally attached to the joint in a second pivot direction.

Claim 64. The aircraft of Claim 63, wherein the propeller includes:  
a center support defined about the horizontal stabilizing means;  
a pair of blades extending outwardly from the center support, each blade having an end distal to the horizontal stabilizing means;  
a pair of crossbars extending outwardly from the center support and perpendicularly from the blades, each crossbar have an end distal from the center support; and  
a safety ring attached to the distal ends of each blade and crossbar.

Claim 65. The aircraft of Claim 64, wherein the pair of blades are parallel to the first pivot direction and the first pivot direction is perpendicular to the second pivot direction.

Claim 66. A self-stabilizing aircraft comprising:

a reservoir for storing a pressurized fluid;

a pneumatic motor mechanism in communication with the reservoir, the pneumatic motor mechanism having a pneumatic motor that uses pressurized fluid contained in the reservoir to rotate a drive shaft;

a horizontal rotatable propeller that is rotated when the drive shaft rotates; and

a horizontal stabilizing means attached between the main propeller and the drive shaft, the horizontal stabilizing means pivotally attached to the main propeller in a first pivot direction and pivotally attached to the drive shaft in a second pivot direction, the first pivot direction being parallel to a pair of blades defined by the propeller and the second pivot direction is perpendicular to the first pivot direction.

Claim 67. The aircraft of Claim 16 further including an inlet assembly in communication with the reservoir, the inlet assembly having a means to permit an external pump to attach thereto, such that the external pump may pump air into and pressurize air inside the reservoir.

Claim 68. The aircraft of Claim 67, wherein the main propeller further includes a pair of crossbars perpendicular to the blades and includes a safety ring attached to ends defined by the blades and crossbars, the ends of the blades and crossbars are distal to a center support area that attaches to the horizontal stabilizing means.

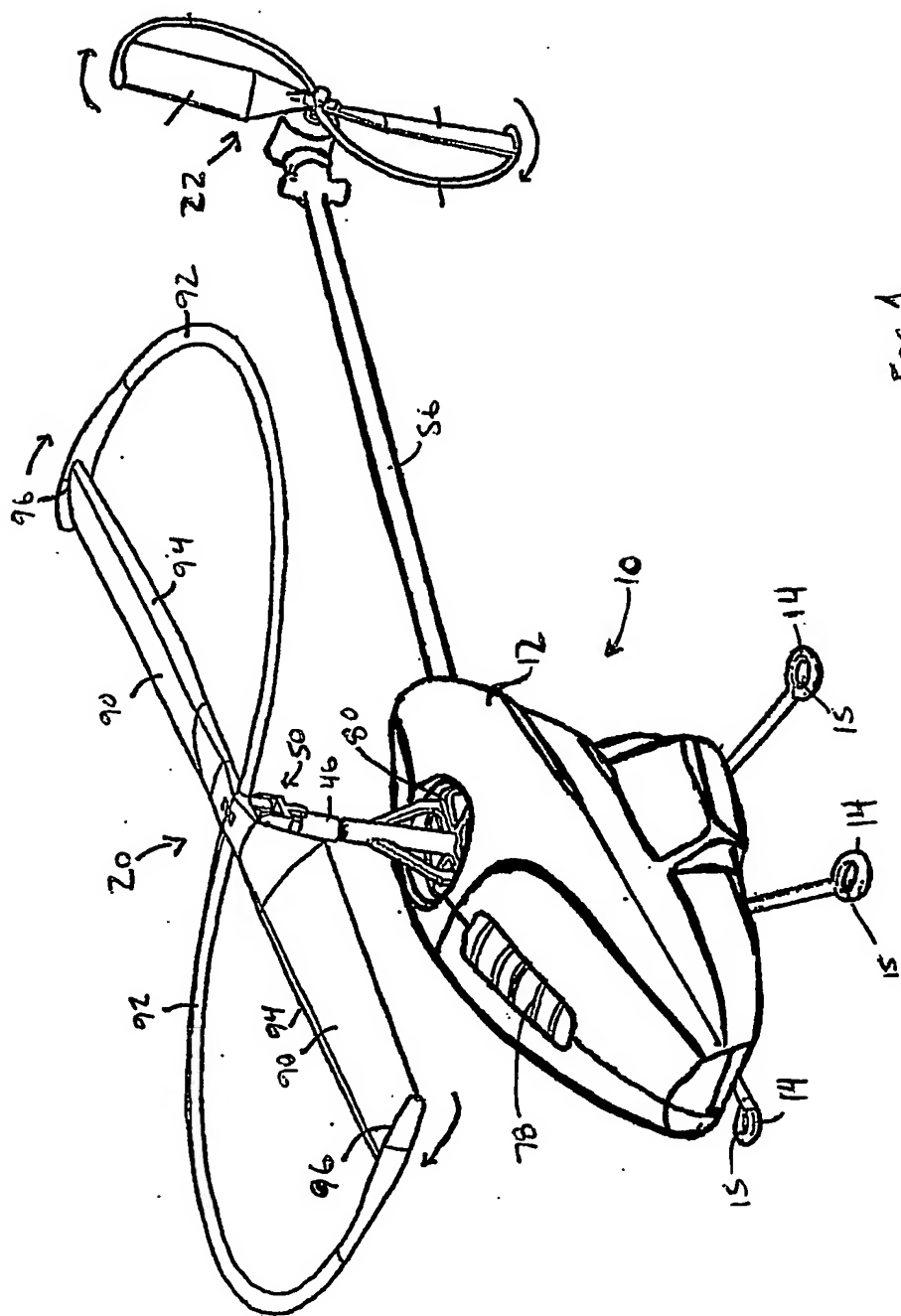
Claim 69. The aircraft of Claim 68, wherein the horizontal stabilizing means further includes:

a rotor attachment that attaches to the center support area of the propeller,



a joint that pivotally connects in the first pivot direction to a lower end defined in the rotor attachment, and

a yoke pivotally attached to the joint in the second pivot direction.



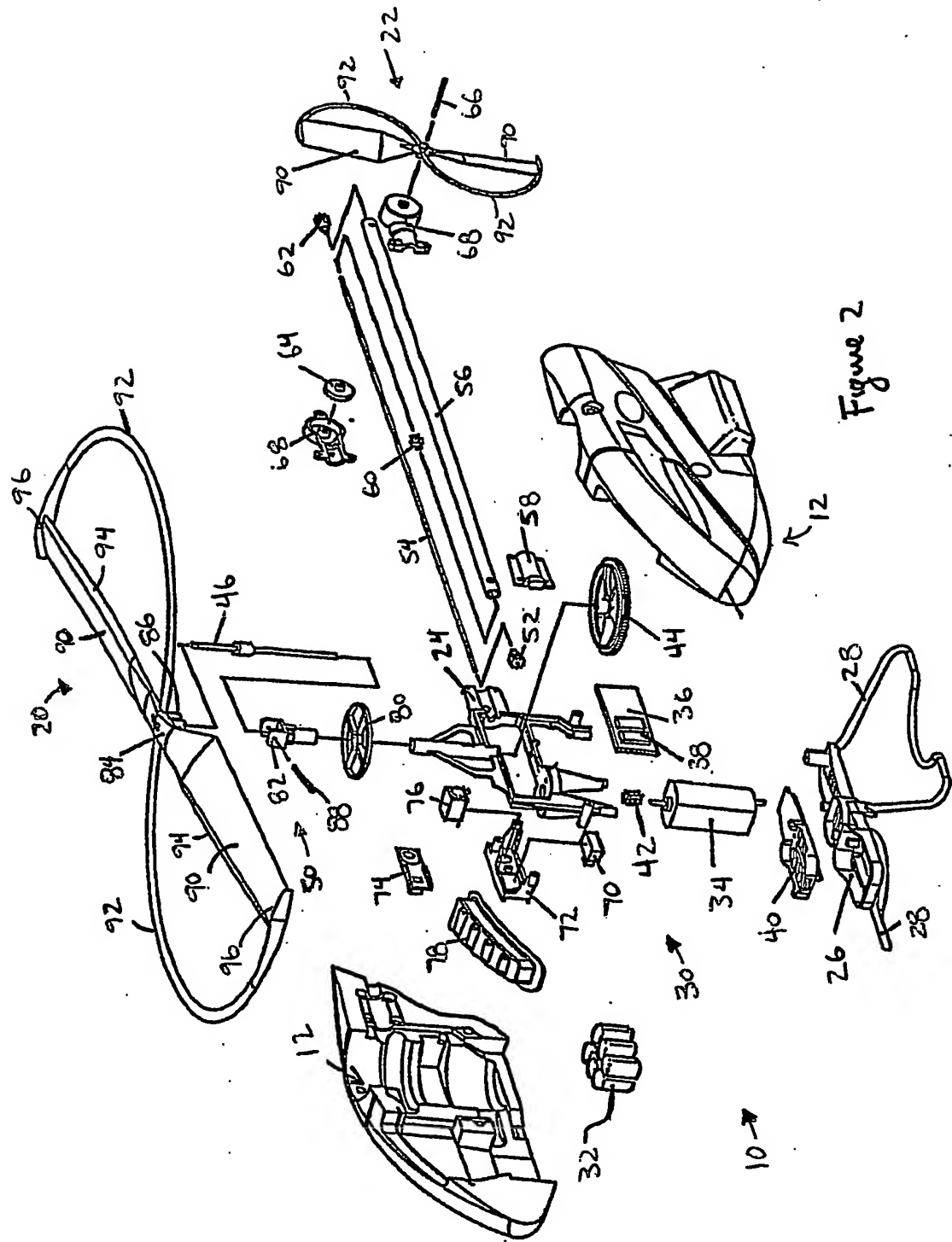


Figure 2

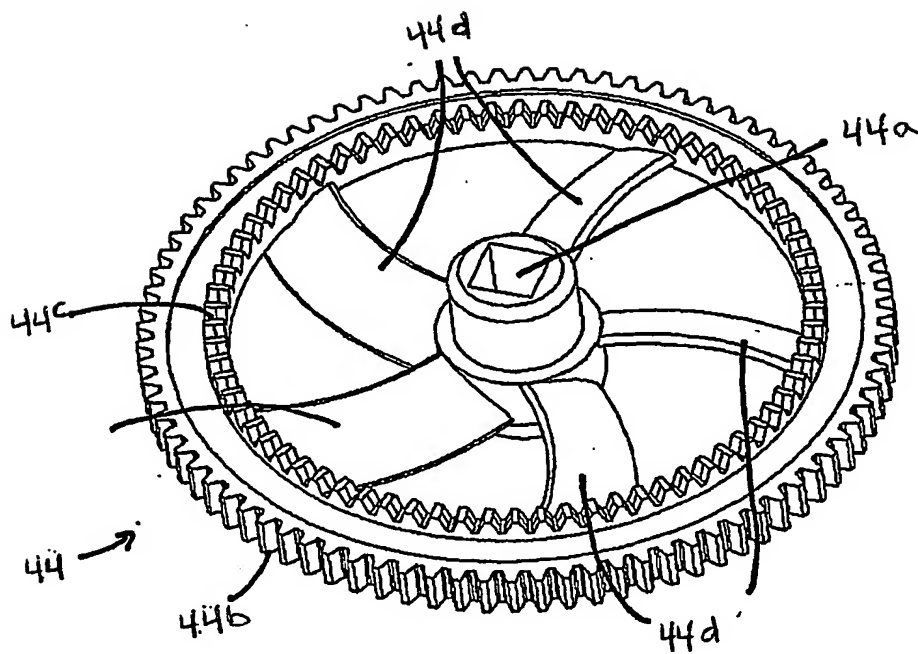
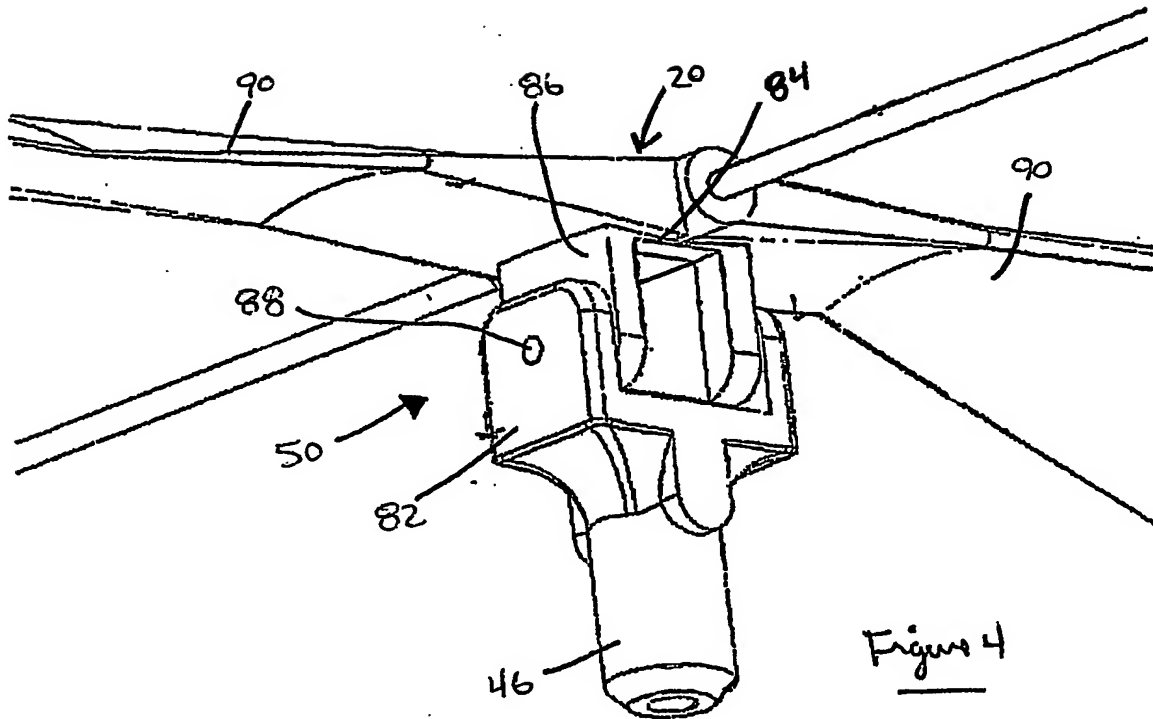


Fig. 3



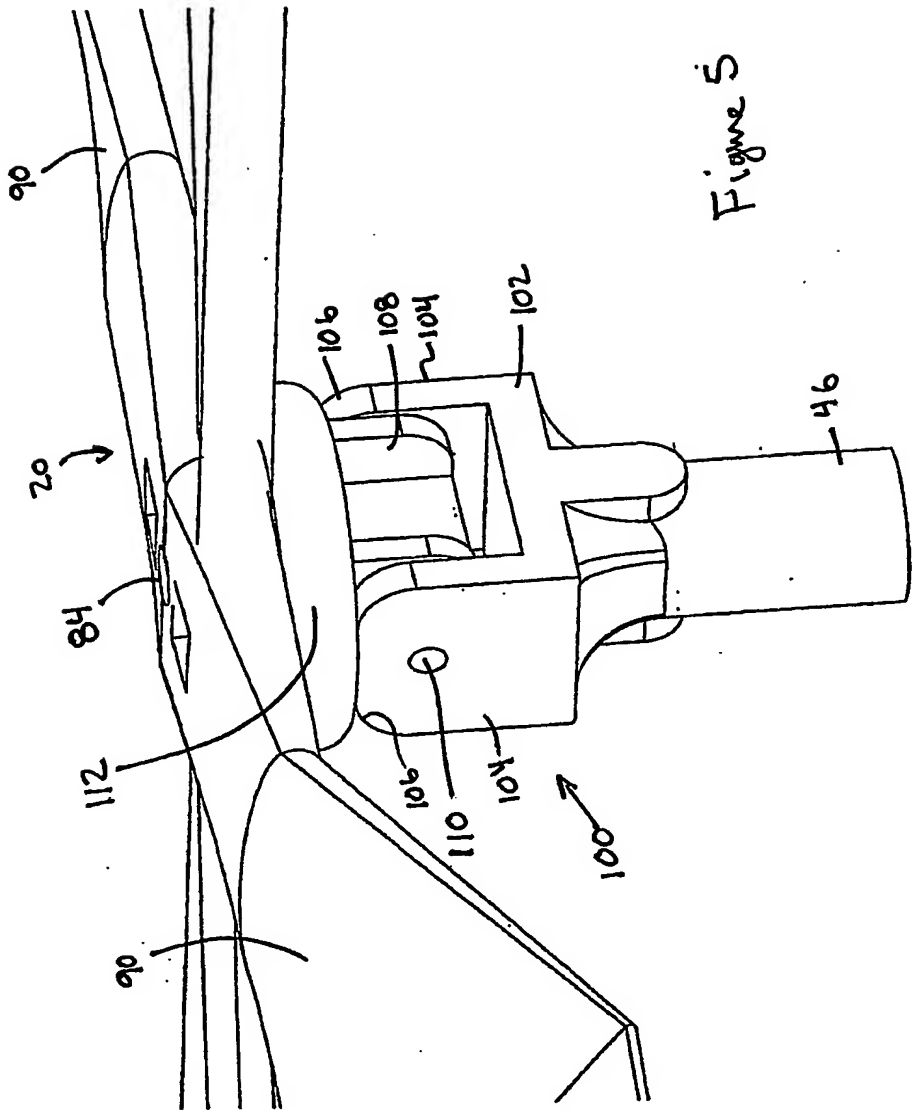
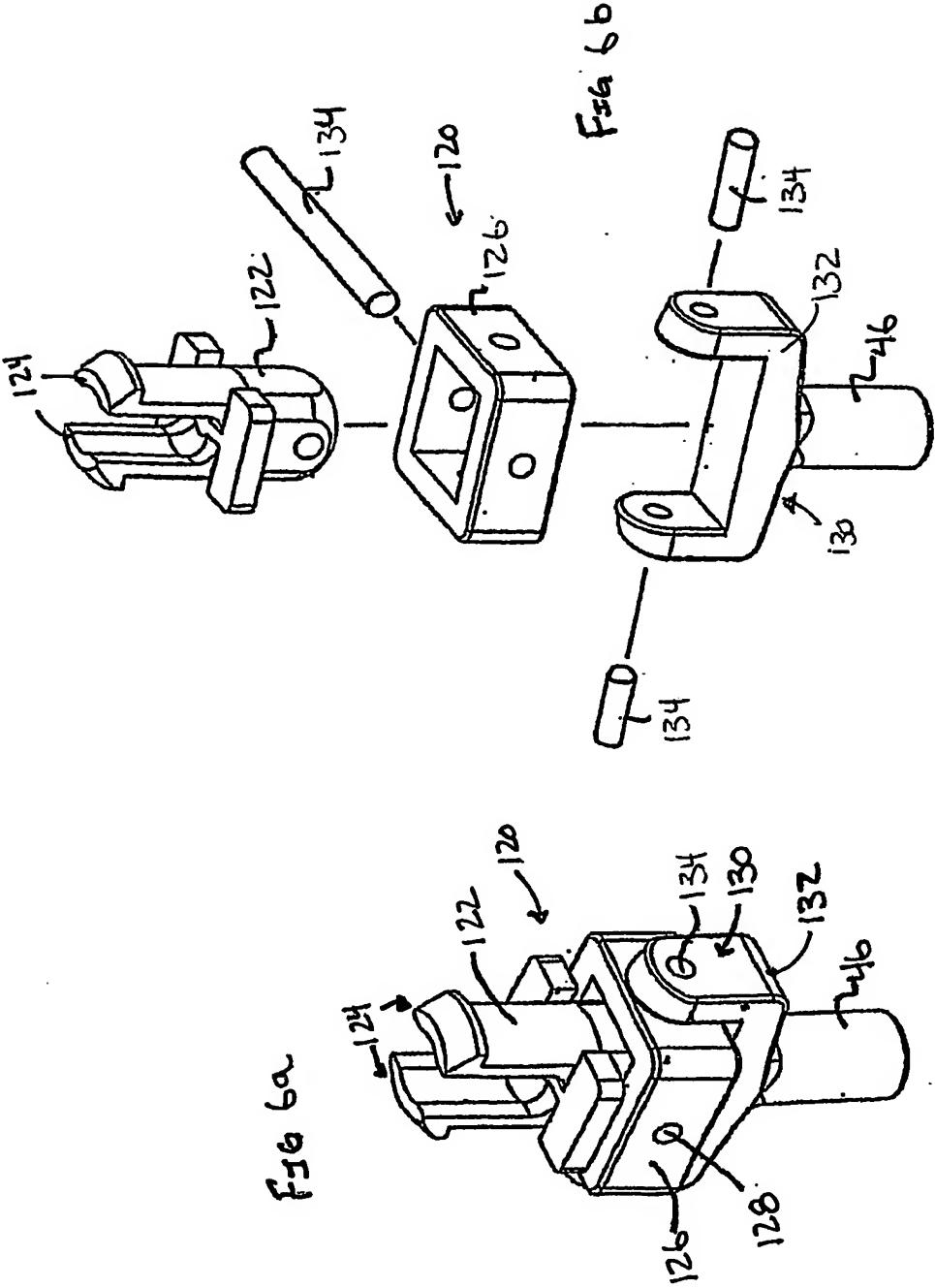
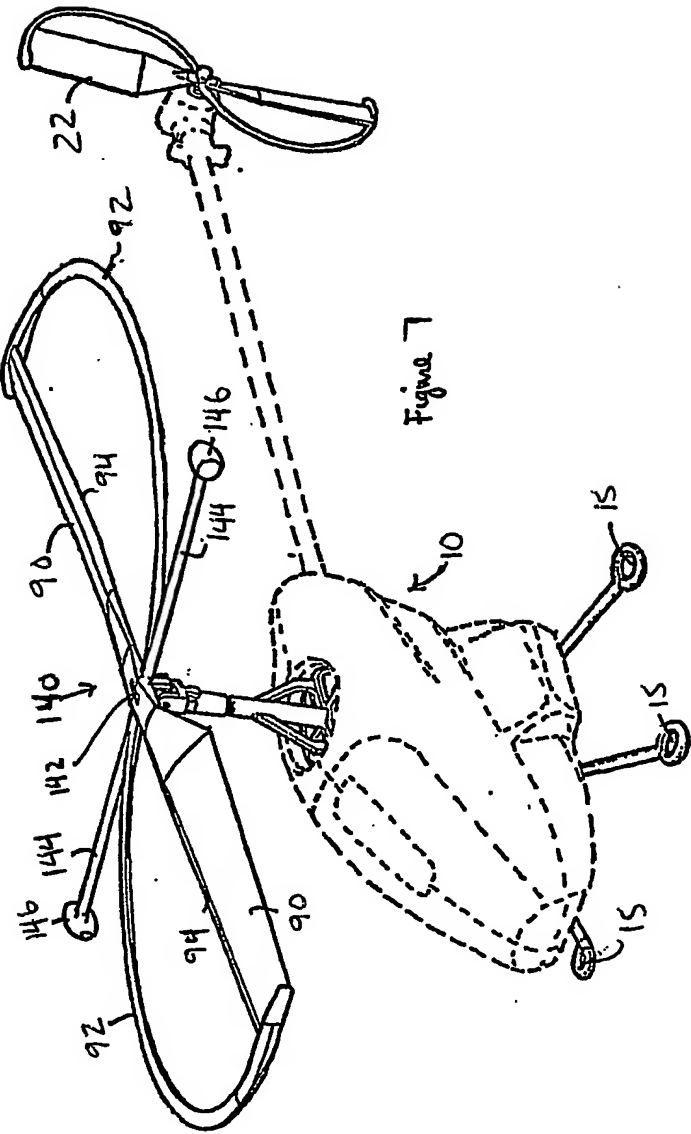
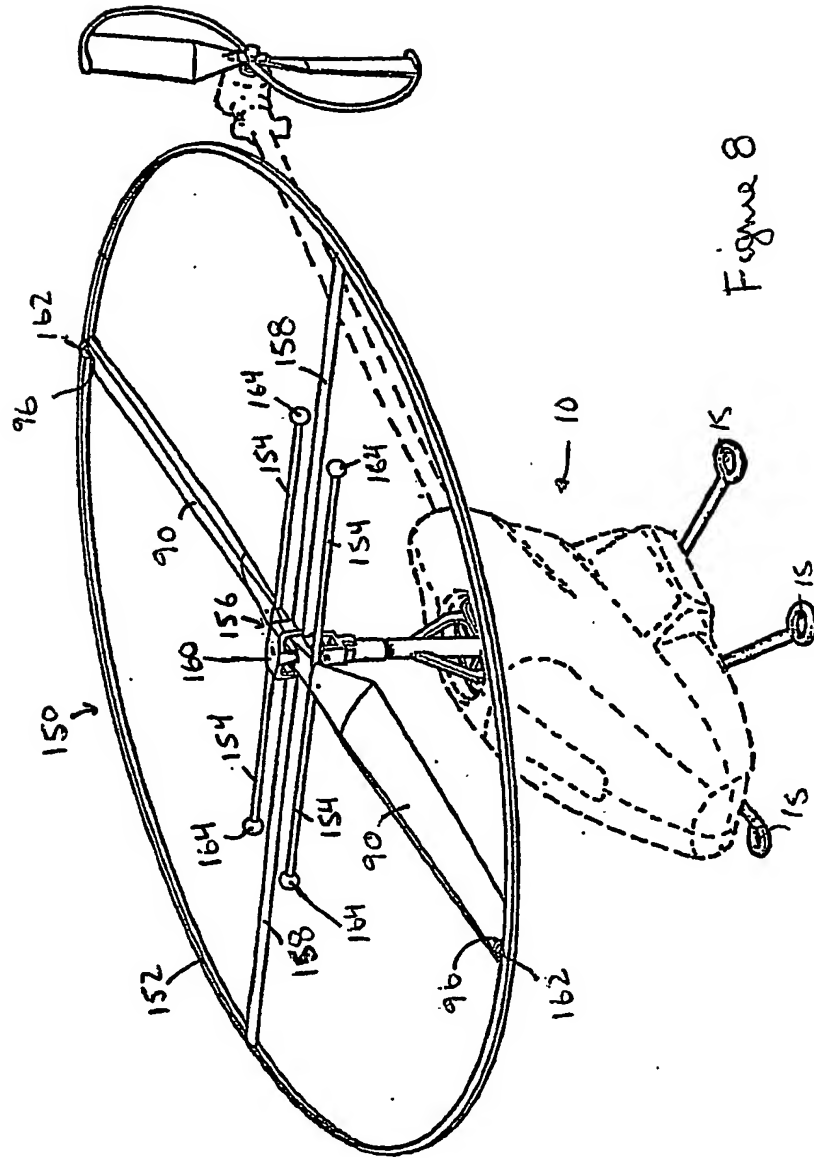


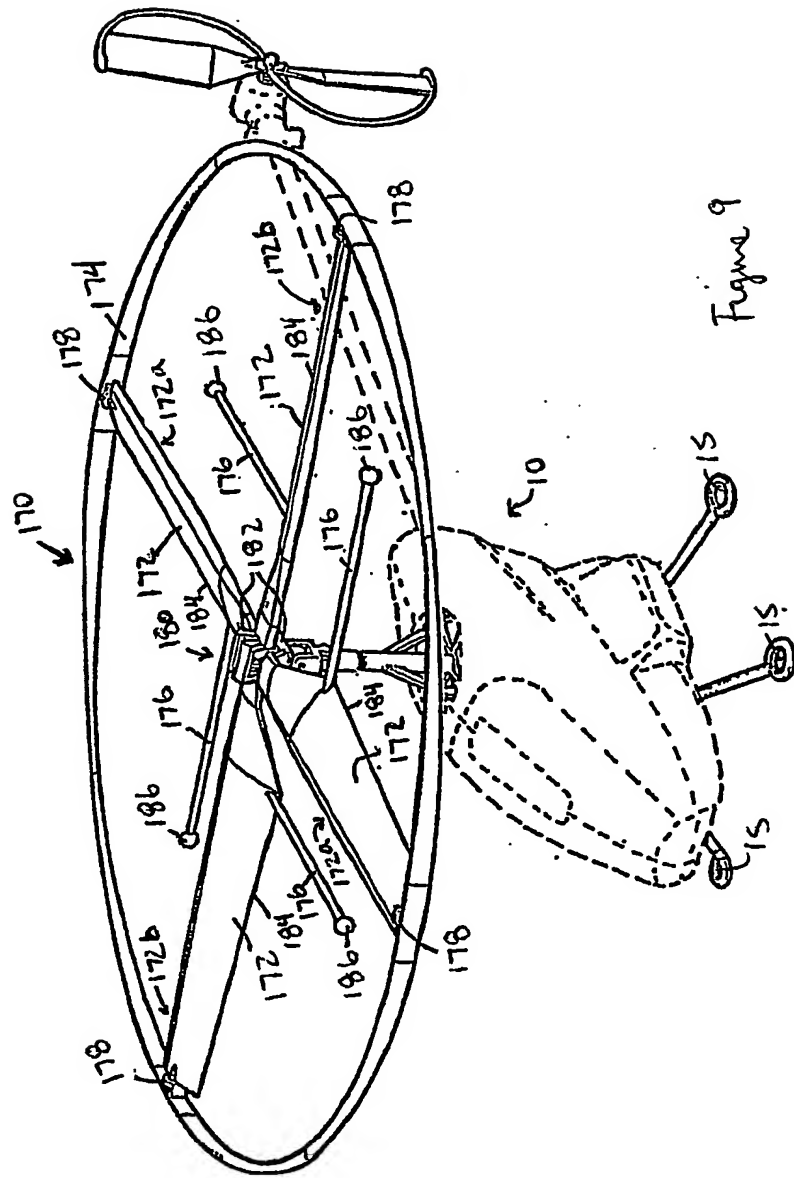
Figure 5

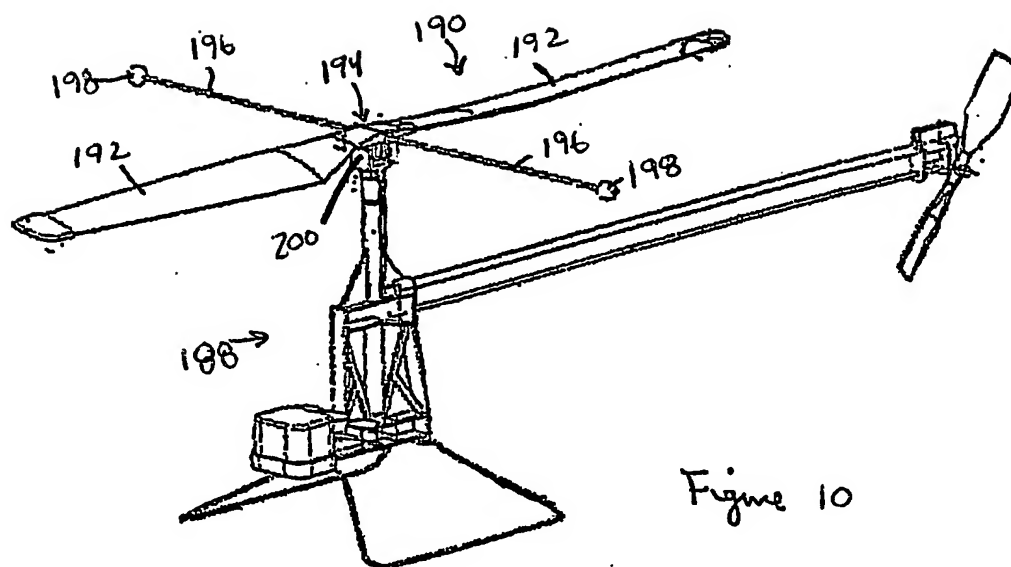


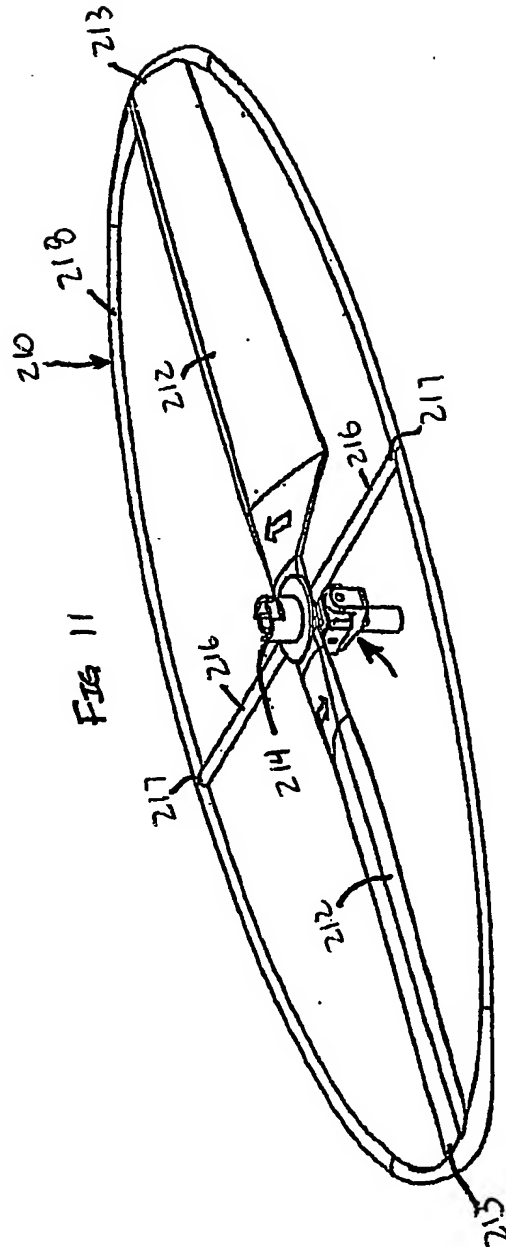












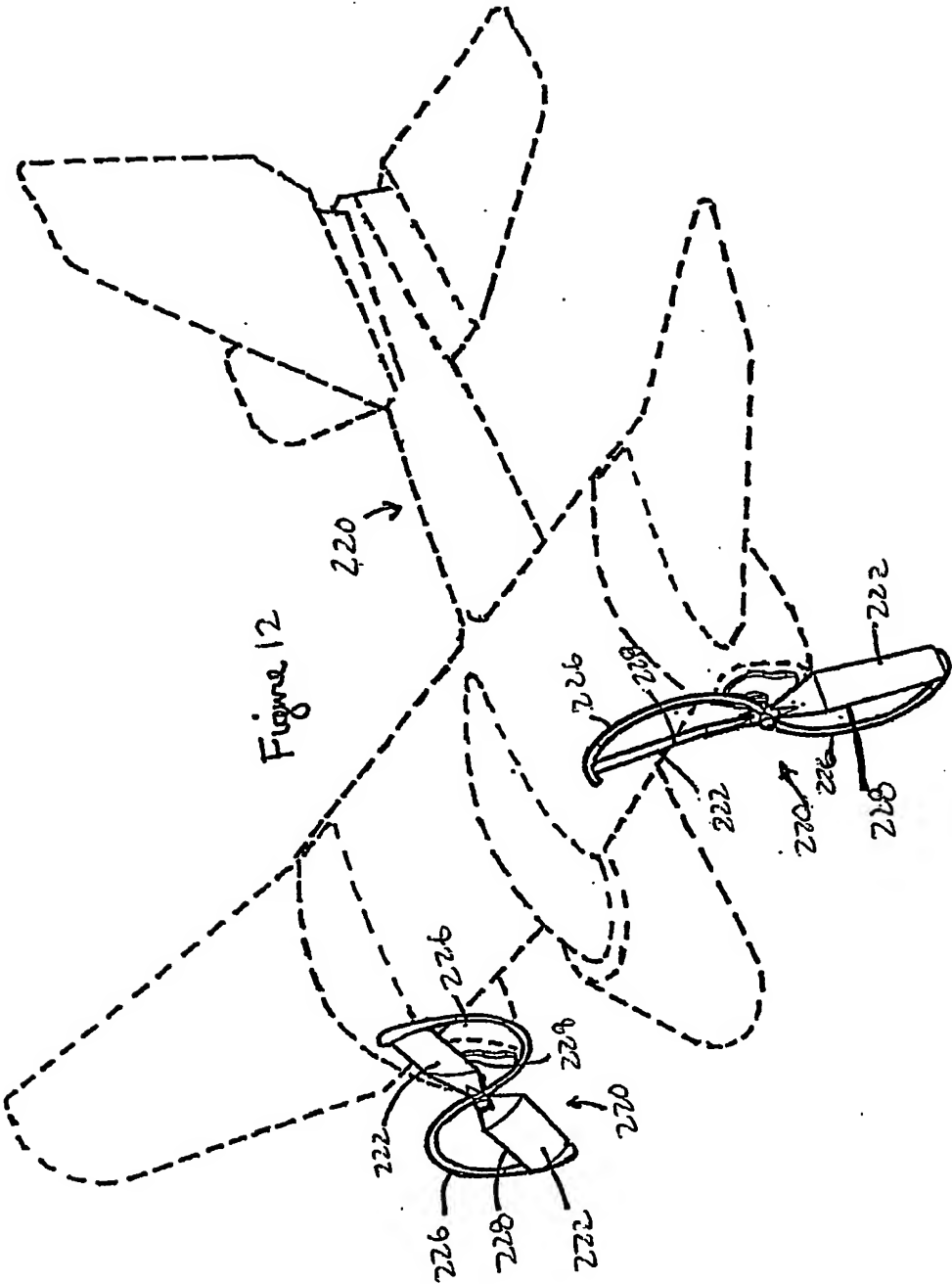


FIG 13

